U.S. Department
of Transportation

**FEDERAL AVIATION
ADMINISTRATION**
Office of Aviation Policy and Plans
Washington, D.C. 20591

FINAL REGULATORY EVALUATION, REGULATORY FLEXIBILITY DETERMINATION, INTERNATIONAL TRADE IMPACT ASSESSMENT, AND UNFUNDED MANDATES ASSESSMENT

FOR FINAL RULE:

REVISED REQUIREMENT FOR MATERIAL STRENGTH PROPERTIES AND DESIGN VALUES FOR TRANSPORT AIRPLANES

(14 CFR PART 25)

**OFFICE OF AVIATION POLICY AND PLANS
OPERATIONS REGULATORY ANALYSIS BRANCH, APO-320**

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March 2003

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EXECUTIVE SUMMARY

This regulatory evaluation examines the impacts of a final rule to revise the requirements for material strength properties and material design values for transport category airplanes. The rule will incorporate changes developed in cooperation with the Joint Aviation Authorities (JAA) of Europe and the U.S. and European aviation industry through the Aviation Rulemaking Advisory Committee (ARAC). The amendments will harmonize FAA requirements with those of the JAA.

There will be no incremental costs resulting from the rule. Rather, the rule will result in cost savings to manufacturers and the FAA by reinstating a provision that permits the Administrator to approve material design values published in accepted military and industry handbooks. An Advisory Circular (AC) will accompany the rule to describe the acceptable methods of compliance. As a result, in certain material design values cases, the FAA estimates that the rule will result in cost savings to manufacturers of transport category airplanes of at least $100,000 per initial aircraft certification. In addition, the FAA will realize an administrative cost saving of approximately $1,577 per certification. Finally, by harmonizing JAA and FAA requirements, the rule will create a single set of requirements accepted in both the United States and Europe. This action will foster international trade and make the aircraft certification process more efficient. Accordingly, the FAA has determined that the rule will be cost-beneficial.

Since the affected transport category airplane manufacturers are not considered small entities, the rule will not impose a significant impact on a substantial number of small entities. The amendments will harmonize with similar requirements of the JAA and thus not constitute a barrier to international trade. Furthermore, the rule does not contain any Federal intergovernmental or private sector mandate that may result in a $100 million or more expenditure (adjusted annually for inflation) in any one year; therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

I. INTRODUCTION

This regulatory evaluation examines the impacts of a final rule to revise the requirements for material strength properties and material design values for transport category airplanes. The rule will incorporate changes developed in cooperation with the Joint Aviation Authorities of Europe and the U.S. and European aviation industry through the ARAC. The new amendments will harmonize FAA requirements with similar ones promulgated by the JAA.

II. BACKGROUND

The manufacturing, marketing, and certification of transport airplanes is increasingly an international endeavor. In order for U.S. manufacturers to export transport airplanes to other countries, the airplane must be designed to comply not only with the U.S. airworthiness requirements for transport airplanes (14 Code of Federal Regulations (CFR) part 25), but also with the transport airworthiness requirements of the countries to which the airplane is to be exported.

The European countries have developed a common airworthiness code for transport airplanes that is administered by the JAA of Europe. This code is the result of a European effort to harmonize the various airworthiness codes of the European countries and is called the Joint Aviation Requirements (JAR). It was developed in a format similar to 14 CFR part 25 (part 25) of the Federal Aviation Regulations (FAR). Although JAR-25 is very similar to part 25, there are differences in methodologies and criteria that often result in the need to address the same

design objective with more than one kind of analysis or test in order to satisfy both part 25 and JAR airworthiness codes.

Section 613 of part 25 (§ 25.613) prescribes requirements for material strength properties and design values. Prior to Amendment 25-72 (55 FR 29776, July 20, 1990), the rule required material strength properties found in certain military or industry handbooks[1] to be used unless specific FAA approval was granted to use other properties. Amendment 25-72 combined §§ 25.613 and 25.615 design properties into one requirement and removed the references to the handbooks. Instead, the requirement to use material strength properties of the handbooks was replaced by a more general requirement specifying probabilities and confidence levels for the properties, leaving test procedures and statistical methods unspecified.

In addition, Amendment 25-72 removed the provision that permitted the Administrator to approve "other design values." The applicant whose transport category airplane's material design values meet either the standards referenced in § 25.613 prior to Amendment 25-72 or comparable European standards[2], but has not shown that those values meet the probability and confidence level in current § 25.613(b), must now show an equivalent level of safety as part of the FAA's certification of the airplane. This process has resulted in unnecessary costs to both the manufacturer and the FAA.

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[1] The handbooks are: Military Handbook (MIL-HDBK)-5, "Metallic Materials and Elements for Flight Vehicle Structure;" MIL-HDBK-17, "Plastics for Flight Vehicles;" Army-Navy-Commerce (ANC)-18, "Design of Wood Aircraft Structures;" and MIL-HDBK-23, "Composite Construction for Flight Vehicles."

[2] European standards include those of Euronorm (EN), International Standards Organization (ISO), and Defence (DEF) Standard 00-932.

III. DISCUSSION OF THE RULE

The rule, which was developed by the ARAC and presented to the FAA as a recommendation for rulemaking, will harmonize material strength properties and material design values with similar revisions in JAA standards.

The heading of § 25.613 is revised to read "Material Strength Properties and Material Design Values." Section 25.613(a) remains unchanged. Section 25.613(b) is revised to clarify that the design values are material design values. Additionally, section 25.613(b) references new § 25.613(f), described below.

The current rule at § 25.613(c) requires consideration of the effects of temperature on allowable stresses used for design. The revised rule requires consideration of environmental conditions in general, including temperature and moisture, on material design values used in an essential component or structure, where those effects are significant within the airplane operating envelope. Moisture can affect material design values of composites. Although not required in the current rule, manufacturers already take into account the effect of moisture on design values. This amendment codifies current industry practice.

Section 25.613(d) is removed. It is addressed in § 25.571 Damage tolerance and fatigue evaluation of structure, and is not needed in this section.

Section 25. 613(e) is revised to clarify that design values are material design values.

New section 25.613(f) reinstates the provision that permits the Administrator to approve other design values. A draft Advisory Circular, AC 25.613-1, developed concurrently with the rule, describes acceptable methods of compliance, including those published in the handbooks referenced in the rule prior to Amendment 25-72 and other standards, such as those of American Society for Testing Materials (ASTM), the European Standards (EN), and International Standards Organization (ISO).

IV. COSTS AND BENEFITS

The FAA determines that there will be no additional costs associated with the rule and the current high level of safety will be maintained. As discussed in the previous section, in addition to harmonizing § 25.613 and JAA requirements, the amendments will clarify the current rule, codify current practice, and reinstate the provision that permits the Administrator to approve other material design values. Consequently, manufacturers of transport category airplanes will not incur any additional costs. In fact, in certain cases, the manufacturer and the FAA will realize cost savings as a result of the revisions. These cost savings are examined in further detail in the following paragraphs.

Under the current rule, there are three potential options on which to base material strength properties and material design values. First, a manufacturer could conduct a material properties development program for each material, product form, and heat treatment. The cost is a function of the number of materials, product forms, and heat treatments and could total between $300,000 and $500,000. Second, a manufacturer could test each aircraft structural part (on a sampling basis) to verify strength characteristics. Based on the cost of materials, testing, and

analysis, the FAA estimates this recurring cost is $6,000 to $60,000 for **each** aircraft structural part over an assumed 300-airplane production run. Third, a manufacturer could use another method for establishing material design values and then request FAA approval of an equivalent safety finding[3]. The FAA estimates that the initial cost of the latter method is between $100,000 and $150,000.[4]

There will be cost savings to the manufacturer and the FAA associated with the provision in the rule permitting the Administrator to approve other material design values (such as those listed in the draft AC). First, under certain conditions, manufacturers of transport category airplanes will no longer need to employ one of the options, described above. If the material design values can be found in the accepted military or industry handbooks[5], the manufacturer would avoid the initial or recurring cost of establishing material design values. Based on analysis of the available options described above, the FAA estimates that this cost saving (i.e., benefits) will be at least $100,000 per initial aircraft certification (the lower estimate of the least costly option).

Second, the (new) provision will eliminate the need for an equivalent safety finding in the third option. The manufacturer will realize minimal cost savings through a reduction in paperwork. For the FAA, the rule will eliminate approximately 30 hours of paperwork per aircraft certificate

[3] For further details, see part 21, section 21(b)(1).

[4] It is important to note that the first and third options incur an initial cost with minimal recurring costs (i.e., paperwork), whereas the second option incurs a noticeable recurring cost. In the long run, the second option would likely cost more than the third option.

[5] For example, the statistical methods specified in MIL-HDBK-5 and -17 would be acceptable for use in establishing material design values. Other statistical methods, amounts of data, and material property data may also be accepted by the FAA, including those specified in the European Standards (noted earlier).

for an FAA aerospace engineer (GS-14, step 5) to conduct an equivalent safety finding. This converts to a cost savings of approximately $1,577 in administrative costs per certificate.[6]

Given the findings of no incremental costs, benefits of at least $100,000 (i.e., cost-savings associated with rule-harmonization), and continuation of the necessary high level of safety, the FAA deems this final rule cost-beneficial.

V. REGULATORY FLEXIBILITY DETERMINATION

The Regulatory Flexibility Act of 1980 (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980

[6] $39.70/hour (GS-14, step 5, excluding locality rates of pay) x 1.3245 (fringe benefits) x 30 hours = $1,577.48. The wage rate for a GS-14, step 5 can be found on the Office of Personnel Management (OPM) website. The fringe

act provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

As stated in the initial regulatory flexibility determination, the rule (as proposed) affected only manufacturers of transport category airplanes. And, since all United States transport category airplane manufacturers exceed the Small Business Administration (SBA) small-entity standard of 1,500 employees for aircraft manufacturers, the FAA determined that the proposal "would not have a significant economic impact on a substantial number of small entities." There were no comments to the docket contesting this finding. Consequently, the FAA now certifies that the final rule "will not have a significant economic impact on a substantial number of small entities."

VI. INTERNATIONAL TRADE IMPACT ASSESSMENT

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards.

In accordance with the above statute, the FAA has assessed the potential effect of this rule and has determined that it complies with the Act since it harmonizes U.S. standards with similar

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benefits factor can be found in Table 4-5, page 4-22, Economic Analysis of Investment and Regulatory Decision--A

European standards. In addition, the rule will impose no incremental costs on either domestic or international manufacturers.

VII. UNFUNDED MANDATES ASSESSMENT

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a $100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action." This rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Guide, FAA-APO-98-4, June 1998 (Analysis).